account of the abnormality it displays in so many particulars. It is well known that the temperature of maximum density of water is lowered by pressure, a fact which was established by Tait in 1883, and, later, by Amagat, and confirmed on theoretical grounds by van der Waals and Puschl. Each increment of 1 atmosphere pressure lowers the temperature of maximum density by 0·0217° C. The influence of pressure on the melting-point of ice is equally well known, and has been frequently studied since it was first pointed out by James Thomson and his brother, Lord Kelvin, in 1849, and its natural effect traced by Faraday and Tyndall in the phenomenon of regelation and the movement of glaciers. The large body of evidence on the relation of pressure to melting-point has been carefully collected and displayed in tabular form. For its discussion we must refer to the work itself.

A considerable section of the work is devoted to a consideration of the influence of pressure upon the flow and permanent increase of density of solid substances, and upon the viscosity of liquids. As regards water, the viscosity diminishes with increasing pressure up to 900 atmospheres, between 0° and 32° C., when it attains a minimum. Above this temperature it increases by pressure; below it it decreases in proportion to the increase of pressure. All the phenomena of the compressibility of water serve to confirm the general belief that it is an associated liquid —*i.e.* its molecular complexity under ordinary natural conditions is not properly represented by the simple formula H_2O.

Space will not permit of more than the briefest possible reference to the remaining sections of this valuable work. These treat of the influence of pressure on the electric conductivity of solutions and solids; on the thermo-electric properties of metals; on dielectric constants; on the validity of Faraday's first law; on solubility, diffusion, refractive index, and polarimetry.

It will be seen from this account that the work is mainly concerned with the influence of pressure upon the physical properties of substances, and to that extent its title is rather a misnomer. It might, perhaps, be more fittingly styled piezophysics. However, the border-line between physics and chemistry is becoming more and more ill-defined, for the spheres of the two sciences gradually merge into each other. There is some point in the good-natured gibe that chemistry, after all, is only the dirty part of physics. We may, however, express the hope that the authors will add to our obligation by extending their work so as to include the influence of pressure upon chemical change. There is now a fairly abundant literature upon the subject, but it requires to be collected, annotated, and digested, and its general principles elucidated. T. E. THORPE.

Social Degeneration.

(1) *Social Decay and Regeneration.* By R. Austin Freeman. With an introduction by Havelock Ellis. Pp. xx+345. (London: Constable and Co., Ltd., 1921.) 18*s*.

(2) *The History of Social Development.* By Dr. F. Müller-Lyer. Translated by Elizabeth Coote Lake and H. A. Lake. With an introduction by Prof. L. T. Hobhouse and Prof. E. J. Urwick. (Studies in Economics and Political Science.) Pp. 362. (London: George Allen and Unwin, Ltd., 1920.) 18*s*. net.

(1) SAMUEL BUTLER tells us that the Erewhonians destroyed all their machines and lived happily ever after. An Erewhonian financier pointed to the "magnificent ruins of the railway-station" as an object of interest in his park. Mr. Austin Freeman, in all seriousness, agrees with the Erewhonians. His book is a searching indictment of the machine as the cause of our present discontents.

> Ill fares the land, to hastening ills a prey,
> Where wealth accumulates and men decay.

The decay wrought by machinery is not numerical; it is something much worse. The ultimate factor of national decline is racial deterioration; and in modern societies this is very extensive and pernicious. Unfavourable variations are not eliminated, and there is a reversed natural selection in favour of the unfit. The essential character of modern civilisation is a war of mechanism on man.

"Mechanism has destroyed industry and replaced it by mere labour; it has degraded and vulgarised the works of man; it has destroyed social unity and replaced it by social disintegration and class antagonism to an extent which directly threatens civilisation; it has injuriously affected the structural type of society by developing its organisation at the expense of the individual; it has endowed the inferior man with political power which he employs to the common disadvantage by creating political institutions of a socially destructive type; and finally, by its reactions on the activities of war, it constitutes an agent for the wholesale physical destruction of man and his works and the extinction of human culture. It is thus strictly analogous to those anti-bodies by which the existence of aggregates of the lower organisms is brought to an end."

These charges are driven home in the most forcible manner. The old craftsman, who made a pair of boots and enjoyed his work, has been displaced by a crowd of factory hands, not one of whom could make a pair of boots, and whose work is irksome drudgery. By absorption into an organised aggregate the workman has become functionally atrophied; he has undergone degeneration. The working class is composed of men of a low average intelligence, in adjustment to the relatively small demands for intelligence made by the conditions of machine production. "That the working class consists largely of men of very slight skill was clearly shown during the war, when so-called 'skilled' men were called up for service and were easily replaced by admittedly unskilled men, or even by shop-girls and domestic servants." Machinery has changed a skilled into an unskilled population. The crew of the *Mayflower* could have established a civilised community; a modern company of factory hands and the like, who are normally parasitic on some machine, would starve on an uninhabited island, or relapse into complete barbarism.

Mr. Freeman has some criticisms, as true as they are scathing, on the component parts of our society. "Mere learning or scholarship, unaccompanied by additions to the sum of existing knowledge, furnishes no evidence of faculty above the level of mediocrity." "The professional politician whom democracy has brought into existence differs entirely from other professional men. He is totally unqualified. Such knowledge as the old parliamentary hand has acquired has no relation to social phenomena. It is purely egoistic." Our Government is as absurd as if medical and surgical knowledge were cultivated only by detached savants, while medical treatment was conducted and surgical operations were performed by strenuous but unlearned "men of action." The First Lord of the Admiralty may be a publisher, a brewer, or a stockbroker. Now that Government control is being extended in every direction, the system is disastrous, and has already produced social, economic, and industrial chaos. Our elaborate technical education, instead of training artists and craftsmen, produces only art-school masters and mistresses and technical-school teachers. The trade unions "have made no effort to regain liberty for their members as free workers or collective owners; though the money spent on a great strike would be sufficient to establish co-operative works on an extensive scale." The manual workers are becoming frankly anti-social as well as anti-democratic. Their activities are directed, not against the employers, but against the community. "The working man tends to be a bad citizen." He plots "to starve the country into submission; to treat his fellow-citizens as a somewhat uncivilised invading army would treat an enemy population." "The profound lack of the most rudimentary ethical conceptions which underlies these anti-social actions becomes manifest when we contrast the implied standard of conduct with that of the more intelligent classes." We cannot imagine the medical profession striking for larger fees in the midst of an epidemic. The bulk of the men no doubt do not realise that they are committing a crime against their fellow-citizens; but this only proves the very low quality of their intelligence. "The sub-man is usually a radically bad citizen."

Society, in a word, is disintegrating. Parasitism, the curse of humanity, is becoming almost universal. "The manual labourer has long since ceased to support himself completely"; "he has obviously arrived at the belief that he has a definite lien on the property of his fellows." The industrious and intelligent—"the only class that matters"—are being taxed and bullied out of existence.

Mr. Freeman has perhaps not allowed quite enough for the power of a body politic, when attacked by disease, to generate anti-toxins to resist the invasion. But though his pessimism may seem too unqualified, the justice of his strictures can scarcely be denied. His remedy, however, is not practicable. It is the "voluntary segregation of the fit"; the establishment of self-contained communities of skilled craftsmen and others, who would help each other to live a wholesome and happy life. Such a community might well be founded in a new country—in Western Canada, Southern Chile, Tasmania, or Rhodesia; the experiment would be well worth making; but in this country the new community would not escape ruinous taxation for the benefit of incapables outside, and would, moreover, be attacked and destroyed by the trade unions.

(2) Dr. Müller-Lyer's book is as typically pre-war as Mr. Freeman's is post-war. It rests throughout on the assumptions of evolutionary optimism. Civilisation *must* be progressing towards a higher state. The author seems to be an admirer of Marx, for he repeats the false statement, so often refuted, that the course of industrialism has tended to make the rich richer and the poor poorer. The presuppositions of the book vitiate its argument, but it contains many

interesting facts and reflections, and, unlike English Socialists, the author sees clearly that the unchecked increase of population is the most fatal obstacle to social amelioration.

W. R. INGE.

X-rays in Medical Practice.

General Practice and X-rays. By Alice V. Knox. With chapters on the production of X-rays and instrumentation by Dr. R. Knox. (The Edinburgh Medical Series.) Pp. xiv+214+xxxii plates. (London: A. and C. Black, Ltd., 1921.) 15*s*. net.

IN view of the great advance which has occurred in radiography and radiotherapy during the past ten years, the author is justified in her contention that the time has come to present to medical practitioners a general survey of the subject in order to enable them to gain a full appreciation of the value of X-rays in diagnosis and treatment. The author divides medical practitioners into three groups: (1) Those who look upon X-rays as something of a scientific plaything; (2) those who rely upon radiology to establish a diagnosis instead of making a careful physical examination; (3) those who recognise in the new science a powerful help in the daily fight against disease, to be applied after a thorough physical examination has been made, when it may be of the greatest use in establishing a diagnosis or in treatment.

When X-rays were first discovered, certain applications to medical diagnosis were at once obvious. These included the discovery and location of metallic foreign bodies, and the diagnosis of fractures and other injuries of the bones. As a natural corollary came the use of X-rays in the study of disease of the bones and joints. With improvement in the construction of apparatus, and with advance in technique, it was found possible to extend the uses of X-rays to the diagnosis of certain internal disorders, such as calculi in the kidneys, and disease of the lungs, heart, and aorta.

The most noteworthy advance of all dates from the discovery that insoluble opaque salts can be administered to patients in sufficient amount to fill the gullet, the stomach, and the intestines, and so enable these hollow organs to be studied. Not only are their size, shape, and position revealed by the opaque meal, but also their contractile activities can be studied. In this way many valuable additions have been made to our knowledge of the physiology and pathology of the organs of digestion. With this far-reaching addition to the uses of X-rays there remain few organs or parts of the body which are not accessible to investigation by them, with good prospect of settling a doubtful diagnosis. If this were all, it would be clear that no medical man could afford to dispense with the services of radiology in the practice of his profession; but X-rays have done a great deal more than this. They have revealed the fact—previously suspected by few—that all disorders of the digestive tract are interdependent: that the stomach, for instance, does not become the subject of a gastric ulcer if all other parts of the digestive tract are healthy, and that the appendix does not become diseased so long as it is in a healthy environment.

Text-books on medicine arrange all diseases under the headings of the various organs of the body. Each organ has a chapter to itself, and each disorder of this organ occupies a "water-tight compartment." For teaching purposes this arrangement, no doubt, has advantages, but it also has the great disadvantage of perpetuating the notion that a chronic disease can arise in an organ of a patient who is otherwise in perfect health. X-ray investigation of the digestive system has demonstrated the fallacy of this conception of disease; it has led to a wide recognition of the importance of "chronic intestinal stasis," a condition due to abnormal delay of the intestinal contents, setting up bacterial decomposition and leading to contamination of the blood-stream. The result of this "toxæmia" is that every tissue of the body receives vitiated blood and becomes depreciated, so that it loses some of its power of repelling the invasion of microbes. Many chronic ailments, such as rheumatism, arise in this way and resist all efforts to cure until the contamination of the intestinal contents has been rectified. The stretching of ligaments, which gives rise to spinal curvature, flat foot, etc., is likewise due to the toxæmia of chronic intestinal stasis. The far-reaching importance of this new conception is clear, for in prescribing remedial exercises to strengthen the muscles of the back, or those of the foot and leg, it is important to attend to the general nutrition of the patient and to the efficient drainage of the intestinal canal, for muscles that are depreciated by contaminated blood cannot respond to attempts to strengthen them by exercises, massage, or electrical treatment, although such treatment would certainly strengthen healthy muscles.

These are only a few instances of the way in which the radiological study of the digestive tract is modifying our entire conception of the causes and treatment of disease.